International Journal of

Human Factors in Manufacturing

ASPECTS OF DESIGN, OPERATION, AND MANAGEMENT OF, ADVANCED MANUFACTURING TECHNOLOGY

VOLUME 4

ISSUES 1–4

January 1994–October 1994

An Interscience® Publication
Published by John Wiley & Sons, Inc.

© 1994 by John Wiley & Sons, Inc.

International Journal of
Human Factors in Manufacturing

EDITORS

Waldemar Karwowski
Professor and Director
Center for Industrial Ergonomics
University of Louisville
Louisville, KY 40292 USA
wøkarwø3@ulkyvm.louisville.edu
Tel. (502) 852-7173; Fax (502) 852-7397

Gavriel Salvendy
NEC Professor of Industrial Engineering
School of Industrial Engineering, 263 Grissom Hall
Purdue University
West Lafayette, IN 47907 USA
salvendy@ecn.purdue.edu
Tel. (317) 494-5426; Fax (317) 494-0874

Editorial Board

P. S. ADLER
University of Southern California, USA

M. AKITA
Kyoto Institute of Technology, Japan

R. U. AYRES
INSEAD, France

R. BADHAM
University of Wollongong, Australia

S. BAGNARA
University of Siena, Italy

P. BRÖDNER
Institut Arbeit und Technik, FRG

H. BULLINGER
Universitat Stuttgart, FRG

C. W. CLEGG
University of Sheffield, UK

F. DANIELLOU
CNAM, France

B. DAS
Technical University of Nova Scotia, Canada

J. A. EDOSOMWAN
Johnson & Johnson Associates, USA

J. R. ETHERTON
NIOSH, USA

H. HENDRICK
University of Southern California, USA

S. HÖRTE
Lulea University of Technology, Sweden

S. L. HWANG
National Tsing Hua University, Taiwan, China

P. KIDD
Cheshire Henbury, UK

D. KORADECKA
Central Institute for Labor Protection, Poland

R. KOUBEK
Purdue University, USA

G. H. KUPER
Industrial Technology Institute, USA

A. MAJCHRZAK
University of Southern California, USA

S. M. MILLER
Fujitsu Ltd., USA

D. L. MORRISON
University of Western Australia, Australia

V. M. MUNIPOV
Applied Ergonomics Association, Russia

M. NAGAMACHI
Hiroshima University, Japan

K. S. PARK
Korea Advanced Institute of Science and Technology, Korea

J. RASMUSSEN
RISO National Laboratory, Denmark

P. SEPPALA
Institute of Occupational Health, Finland

J. SHARIT
SUNY at Buffalo, USA

T. B. SHERIDAN
Massachusetts Institute of Technology, USA

G. I. SUSMAN
The Pennsylvania State University, USA

M. TACHIBANA
NEC Corporation, Japan

E. ULICH
ETH-Zentrum, Switzerland

R. E. WALTON
Harvard University, USA

L. XU
Chinese Academy of Sciences, Beijing, China

Information and Book Review Editor
PAUL KIDD
Cheshire Henbury
Tamworth House
P.O. Box 103
Macclesfield, SK 11 8UW, UK

Journal Administrator
LAURA ABELL
University of Louisville, USA

Editorial Production
JOHN PORTER
John Wiley & Sons, Inc.

The *International Journal of Human Factors in Manufacturing* (ISSN: 1045-2699) is published quarterly by John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158.

Copyright © 1994 by John Wiley & Sons, Inc. All rights reserved. No part of this publication may be reproduced in any form or by any means, except as permitted under section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the publisher, or authorization through the Copyright Clearance Center, 27 Congress Street, Salem, MA 01970, (508) 744-3350, fax (508) 745-9379. Second-class postage paid at New York, NY, and at additional mailing offices.

The code and the copyright notice appearing at the top of the first page of an article in this journal indicate the copyright holder's consent that copies may be made for personal or internal use, or for the personal or internal use of specific clients, on the condition that the copier pay for copying beyond that permitted by Sections 107 or 108 of the United States Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. Such permission requests and other permission inquiries should be addressed to the Permissions Department.

Subscription price: (Volume 4, 1994): $175.00 in US, $215.00 in Canada and Mexico, $230.00 outside North America. All subscriptions outside US will be sent by air. Personal rate: $75.00 in US, $95.00 outside North America. Subscriptions at the personal rate are available only to individuals. Payment must be made in US dollars drawn on a US bank. Claims for undelivered copies will be accepted only after the following issue has been received. Please enclose a copy of the mailing label. Missing copies will be supplied when losses have been sustained in transit and where reserve stock permits. Please allow four weeks for processing a change of address. For subscription inquiries, please call (212) 850-6645.

Postmaster: Send address changes to *International Journal of Human Factors in Manufacturing*, Susan Malawski, Fulfillment Manager, John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158. For subscription inquiries, please call customer service at (212) 850-6645 or write to the above address.

Advertising: Inquiries should be forwarded to Roberta Frederick, Advertising Sales, John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158, (212) 850-8832. Advertising Sales, European Contact: Michael Levermore, Advertising Manager, John Wiley & Sons, Ltd., Baffins Lane, Chichester, Sussex PO 19 1UD, England.

Reprints: Reprint sales and inquiries should be directed to the customer service department, John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10158. Tel: (212) 850-8776

Other Correspondence: Address all other correspondence to *International Journal of Human Factors in Manufacturing*, Publisher, Interscience Division, Professional, Reference, and Trade Group, John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158.

Manuscripts should be submitted to Professor Waldemar Karwowski at the above address.

The contents of this journal are abstracted in *Cambridge Scientific Abstracts*.

This journal is printed on acid-free paper.

The International Journal of Human Factors in Manufacturing, Vol. 4 (4) 431–433 (1994)
© 1994 John Wiley & Sons, Inc. CCC 1045-2699/94/040431-03

International Journal of
Human Factors in Manufacturing

Contents
Volume 4, 1994
Issue 1, January 1994

Integrating People, Organization, and Technology in Advanced Manufacturing: A Position Paper Based on the Joint View of Industrial Managers, Engineers, Consultants, and Researchers 1
W. Karwowski, G. Salvendy, R. Badham, P. Brodner, C. Clegg, S. L. Hwang, J. Iwasawa, P. T. Kidd, N. Kobayashi, R. Koubek, J. LaMarsh, M. Nagamachi, M. Naniwada, H. Salzman, P. Seppala, B. Schallock, T. Sheridan, and J. Warschat

---

Special Issue
Implementation Issues for Advanced Manufacturing Systems

Guest Editorial: Implementation of Advanced Technological Systems 21
Yash P. Gupta and Hamid R. Parsaei

Organizational, Technical, Strategic, and Managerial Issues along the Implementation Process of Advanced Manufacturing Technology—A General Framework of Implementation Guide 23
Hongyi Sun and Jens Ove Riis

Multifactor Learning and Forgetting Models for Productivity and Performance Analysis 37
Adedeji B. Badiru

Human Resource Issues Affecting the Survival of U.S.Apparel Manufacturing 55
Bernard J. Schroer and M. Carl Ziemke

An Implementation Model for Reducing Resistance to Technological Change 65
Mica R. Endsley

Evaluation of Alternative Transition Strategies for Advanced Technology Systems 81
James T. Luxhoj

Calendar of Events 95

Book Review 97

Forthcoming Articles 99

Issue 2, April 1994

Strategy for Supporting Organization and Structuring of Development Teams in Concurrent Engineering 101
Toshiyuki Adachi, Li Chung Shih, and Takao Enkawa

Management Control and the Manufacturing Hierarchy: Managing Integrated Manufacturing Organizations 121
Ronald F. McPherson and K. Preston White, Jr.

Usability in CAD—A Psychological Perspective 145
Carl Martin Allwood and Thomas Kalén

Environment, Manufacturing Technology, and Embedded Knowledge 167
Marion G. Sobol and David Lei

Psychosocial and Physical Working Conditions and Associated Musculoskeletal Symptoms Among Operators in Five Plants Using Arc Welding in Robot Stations 191
Jån Å. Johansson and Kathe Nonås

Analytical Modeling and Experimental Study of Human Workload in Scheduling of Advanced Manufacturing Systems 205
Shuxin Bi and Gavriel Salvendy

Calendar of Events 235

Book Review 237

Forthcoming Articles 239

Conference Anouncement 240

Issue 3, July 1994

Special Issue

Swedish Experience in Integrating People, Technology, and Organizations

Guest Editorial: Technological, Organizational, and Human Development of Manufacturing Processes—Design, Methods, and Performance 241
Sven Åke Hörte

Performance Effects of Human and Organizational Development and Technological Development 243
Sven Åke Hörte and Per Lindberg

Balancing Technological, Organizational, and Human Aspects in Manufacturing Development 261
Anders Berger

Repetitive and Manual Jobs—Content and Effects in Terms of Physical Stress and Work-Related Musculoskeletal Disorders 281
Marita Christmansson

Extended Work Cycle Assembly—A Crucial Learning Experience 293
Tomas Engström, Lars Medbo, and Dan Jonsson

Managing Deliberations in Product Development—Relating Organization to Process 305
Mats Lundqvist

Rapid Prototyping—The Swedish Industry Experience 321
Lars Trygg

Calendar of Events 339

Book Review 341

Forthcoming Articles 344

Issue 4, October 1994

Group Work in the American and German Nonautomotive Metal Manufacturing Industry 345
Noel Harvey and Marhild von Behr

The Effects on Health of Qualified Computer Work: Implications of the Use of Computer-Aided Design Systems 361
Svante Hovmark and Margareta Norell

Cognitive and Sociotechnical Issues in Design for Manufacturability 375
Martin G. Helander

Technical Support for Experience-Based Work: A New Development Perspective for CNC-Machine Tools 391
Fritz Böhle, Ursula Carus, and Hartmut Schulze

A Fuzzy Knowledge-Based System of Learning by Analogy for a Process Analysis Task: The Sewing Industry 409
Tsutomu Tabe, Yumiko Taguchi, Noriko Maki, and Hiroyasu Asai

Calendar of Events 423

Book Review 425

Volume Contents 431

Author Index 434

Forthcoming Articles 436